A Microscopic Calculation of Secondary Drell-Yan Production in Heavy Ion Collisions*

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Measurements of the intermediate mass dimuon continuum [1] show that in nucleus-nucleus collisions the yield is enhanced over that expected from conventional sources. We have shown that in addition to the lepton pairs produced by the Drell-Yan mechanism in the initial nucleon-nucleon collisions, the contribution from the hard valence antiquarks in the produced particles can be important, particularly from meson-baryon interactions. A microscopic hadronic transport code, URQMD [2], is employed to obtain a realistic collision spectrum of secondary hadrons. Since the calculation is performed at leading order only, the result is multiplied by a "K-factor". The dimuon spectra produced in $\pi + A$ reactions are well reproduced by our leading order calculations, scaled by a K factor of 2.

In pion-nucleon collisions, valence quark-antiquark annihilation can play a significant role in the Drell-Yan process. The pion-nucleon cross sections are consequently higher than the nucleon-nucleon cross sections, especially when $m/\sqrt{s} \gtrsim 0.1$.

The typical scaling of the Drell-Yan cross section assumes an equal probability for Drell-Yan pair production in each nucleon-nucleon interaction. In addition, in a separate microscopic simulation the meson-baryon, meson-meson and baryon-antibaryon collisions, involving newly produced hadrons, are calculated within the URQMD transport model. The most important secondary contribution is from meson-baryon interactions. Around 2 GeV these additional contributions are not negligible in nucleus-nucleus collisions while the increase is less than 5 % in the p+W case. Our calculation is not in conflict with existing pA data.

At masses around 1.5 GeV, an enhancement of 25 % is expected in S+U interactions and 45 % in Pb+Pb interactions. Thus at least part of the observed enhancement of muon pairs at intermediate and low masses [1] might be caused by this previously neglected hadronic source. This enhancement is increased if, during the early stages of the system evolution, partons can scatter and annihilate before they have come on mass-shell. To estimate the importance of these "preresonance" $q\bar{q}$ annihilations, we relax the restriction that the partons can only interact after they have hadronized by decreasing the formation time of the produced hadrons, τ_F, from the "default" value. With an intermediate formation time, $\tau_F = 0.5$ fm/c, the enhancement in the range $1.5 < m < 2.5$ GeV shows good agreement with the intermediate mass data [1].

[1] C. Lourenço *et al.* (NA38 Coll.), Nucl. Phys. **A566** (1994) 77c. M.A. Mazzoni *et al.* (Helios-3 Coll.), Nucl. Phys. **A566** (1994) 95c. C. Lourenço, in Procs. of the Hirschegg '95 Workshop, p.163 (CERN-PPE/95-72). I. Kralik, in Proceedings of the Hirschegg '95 Workshop, p.143. E. Scomparin *et al.* (NA50 Coll.), Nucl. Phys. **A610** (1996) 331c.

[2] S.A. Bass *et al.*, URQMD, source code and technical documentation, to be published. L.A. Winckelmann *et al.*, Nucl. Phys. **A610** (1996) 116c.

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